

PATENT

Attorney Docket No. 400762/Aoyama

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

SUZUKI et al.

Application No.: 09/613,749

Art Unit: 2814

Filed: July 11, 2000

Examiner: S. Rao

SEMICONDUCTOR
DEVICE



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**CLAIMS PENDING AFTER AMENDMENT IN
RESPONSE TO THE OFFICIAL ACTION MAILED OCTOBER 19, 2001**

1. A semiconductor device comprising:

- (a) an electrically isotropic compound semiconductor substrate having a first surface and a second surface;
- (b) an active region on the first surface of the substrate;
- (c) a first semiconductor element in the active region, including
 - first and second channel regions having width directions essentially perpendicular to each other,
 - a first source electrode and a first drain electrode, adjacent to the first and second channel regions and opposing each other with the first and second channel regions therebetween, and in ohmic contact with the active region, and
 - a first gate electrode on the first and second channel regions and along the first source electrode and the first drain electrode, and bent at at least one bending position; and
- (d) a second semiconductor element on the active region adjacent to the first semiconductor element, including
 - third and fourth channel regions adjacent to the first and second channel regions, respectively, with one of the first source electrode and the first drain electrode therebetween,

one of a second source electrode and a second drain electrode opposing the first drain electrode or the first source electrode [through] across the third and fourth channel regions, and in ohmic contact with the active region, and

a second gate electrode on the third and fourth channel regions and along one of the second source electrode and the second drain electrode, and bent at at least one bending position.

2. The semiconductor device according to claim 1, wherein the source electrode and the drain electrode are band-like electrodes, and the bending position of the first gate electrode and the bending position of the second gate electrode lie on a straight line substantially parallel to a longer side of the active region.

3. The semiconductor device according to claim 1, further comprising:
a source-drawing wire on the first source electrode and along the first source electrode;
a source common wire connected to the source-drawing wire;
a drain-drawing wire on the first drain electrode and along the first drain electrode;
a drain common wire connected to the drain-drawing wire; and
a gate common wire connected to the first gate electrode, wherein the drain common wire is opposite the source common wire and the gate common wire across the active region, and wherein the source-drawing wire is connected to the source common wire through an air bridge extending across the gate common wire.

4. The semiconductor device according to claim 1, comprising:
a fifth channel region joining the second channel region and having a width direction essentially perpendicular to the width direction of the second channel region, wherein the first gate electrode is disposed on the first, second, and fifth channel regions and is bent at the first bending position and at a third bending position;

a sixth channel region joining the fourth channel region and having a width direction essentially perpendicular to the width direction of the fourth channel region, wherein the second gate electrode is disposed on the third, fourth, and sixth channel regions and is bent at the second bending position and at a fourth bending position; and

first and second insulating regions on the semiconductor substrate and under the first and second bending positions of the first and second gate electrodes, and under the third and fourth bending positions of the first and second gate electrodes, respectively.

5. The semiconductor device according to claim 1, wherein the first source electrode has a rectangular shape, two sides of which are adjacent to the first and second channel regions, respectively, and wherein the first source electrode is connected to a conductive film on the second surface of the semiconductor substrate through a via-hole in the first source electrode.

6. The semiconductor device according to claim 5, comprising:

a fifth channel region joining the second channel region and having a width direction essentially perpendicular to the width direction of the second channel region, wherein the first gate electrode is disposed on the first, second, and fifth channel regions and is bent at the first bending position and at a third bending position;

a sixth channel region joining the fourth channel region and having a width direction essentially perpendicular to the width direction of the fourth channel region, wherein the second gate electrode is disposed on the third, fourth, and sixth channel regions and is bent at the second bending position and at a fourth bending position; and

first and second insulating regions on the semiconductor substrate and under the first and second bending positions of the first and second gate electrodes, and under the third and fourth bending positions of the first and second gate electrodes, respectively.

7. The semiconductor device according to claim 6, wherein the width of at least one of the first and second channel regions is narrower than the width of the source electrode adjacent the channel region.

8. The semiconductor device according to claim 5, wherein the first gate electrode has two bending positions at which the first gate electrode is bent, the first gate electrode being bent in opposite directions at the two bending positions, and wherein the second gate electrode has two bending positions at which the second gate electrode is bent so that the second gate electrode extends substantially at a uniform spacing from the first gate electrode.

9. The semiconductor device according to claim 5, wherein the first gate electrode and the second gate electrode are spaced uniformly from each other and including a common pad electrode extending across and connected to the first and second gate electrodes at the bending position of the first gate electrode and the bending position of the second gate electrode.

11. The semiconductor device according to claim 1, wherein the first gate electrode and the second gate electrode share one of the first source electrode and the first drain electrode.

12. The semiconductor device according to claim 1, wherein the first gate electrode is bent at a right angle at the bending position.

13. The semiconductor device according to claim 1, wherein an angle formed between the width direction of the first gate electrode and a longer side direction of the active region is essentially 45° .